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west virginia department of environmental protection

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Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304  
(304) 926-0450  
(304) 926-0452 fax

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

April 01, 2014

NOBLE ENERGY, INC.  
333 TECHNOLOGY DRIVE, SUITE 110  
CANONSBURG, PA 15317

Re: Permit Modification Approval for API Number 8510068 , Well #: PEN2BHS

Lateral Extended

Oil and Gas Operator:

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

Gene Smith  
Regulatory/Compliance Manager  
Office of Oil and Gas

085 10068

MOD



January 29, 2014

West Virginia Department of Environmental Protection

601 57<sup>th</sup> Street, SE

Charleston, WV 25304-2345

Re: PEN2 Wells API 47-085-10067 AHS/ 47-085-10068 BHS/ 47-085-10055 CHS

Dear Sirs:

Enclosed please find permit modifications to extend the lateral legs on the above referenced wells. I have enclosed a new casing program signed by the inspector, new survey plat and revised mineral exhibits. These wells are located in Ritchie County, WV.

Should you have any questions, or desire any additional information, please do not hesitate to contact me at 724-820-3061 or via email at [dswiger@nobleenergyinc.com](mailto:dswiger@nobleenergyinc.com).

Sincerely,

A handwritten signature in black ink, appearing to read 'Dee Swiger', written over the printed name.

Dee Swiger

Regulatory Analyst III

DS/

Enclosures:

RECEIVED  
Office of Oil and Gas  
JAN 31 2014  
WV Department of  
Environmental Protection

MOD

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WELL WORK PERMIT APPLICATION

1) Well Operator: Noble Energy, Inc. 494501907 085 Clay Pennsboro  
Operator ID County District Quadrangle

2) Operator's Well Number: PEN2BHS Well Pad Name: PEN2

3 Elevation, current ground: 1074.85 Elevation, proposed post-construction: 1075.4

4) Well Type: (a) Gas  Oil  Underground Storage   
Other \_\_\_\_\_  
(b) If Gas: Shallow  Deep   
Horizontal

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Target-Marcellus, Depth- 6262-6324; Thickness- 62"; Pressure- 4174 # psi

7) Proposed Total Vertical Depth: 6314'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 16145'

10) Approximate Fresh Water Strata Depths: 454'

11) Method to Determine Fresh Water Depth: Closest well & Seneca Technology data base

12) Approximate Saltwater Depths: 1244'

13) Approximate Coal Seam Depths: no coal

14) Approximate Depth to Possible Void (coal mine, karst, other): none

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: no

16) Describe proposed well work: Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6314 feet.  
Drill Horizontal leg - stimulate and produce the Marcellus Formation.

Should we encounter a unanticipated void we will install a minimum of 20' of casing below the void but not more than 50' set a basket and grout to surface.

17) Describe fracturing/stimulating methods in detail:  
The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 8.43

19) Area to be disturbed for well pad only, less access road (acres): 8.0

REGISTERED  
Office of Oil and Gas  
JAN 31 2014  
West Virginia Department of  
Environmental Protection

DW  
1-21-14

20)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft.</b>	<b>FOOTAGE: For Drilling</b>	<b>INTERVALS: Left in Well</b>	<b>CEMENT: Fill -up (Cu. Ft.)</b>
Conductor	20"	N	LS	52	40'	40'	GTS
Fresh Water	13 3/8"	N	J-55	54.5	579'	579'	CTS
Coal							
Intermediate	9 5/8"	N	HCK-55 BTC	36.0	5410'	5410'	CTS
Production	5 1/2"	N	HCP-110 T3P BTC	20.0	16145'	16145'	50 bbls 10 ppg spacer, 120 ppg lead slurry, (300) of 150 ppg Class A lead slurry cemented to surface
Tubing							
Liners							

<b>TYPE</b>	<b>Size</b>	<b>Wellbore Diameter</b>	<b>Wall Thickness</b>	<b>Burst Pressure</b>	<b>Cement Type</b>	<b>Cement Yield</b>
Conductor	20"	26"	.25	2730	Grout to Surface	Grout to Surface
Fresh Water	13 3/8"	17 1/2"	.380	2730	Type 1	1.18
Coal						
Intermediate	9 5/8"	12.25"	.352	3520	Class A	1.19
Production	5 1/2"	8.75/8.5"	.361	12,640	Class A	1.27
Tubing						
Liners						

**PACKERS**

Kind:				
Sizes:				
Depths Set:				

*DWR*  
1-21-14

*Engineering*  
*1-21-14*  
Page 2 of 3

085 10068 MOD

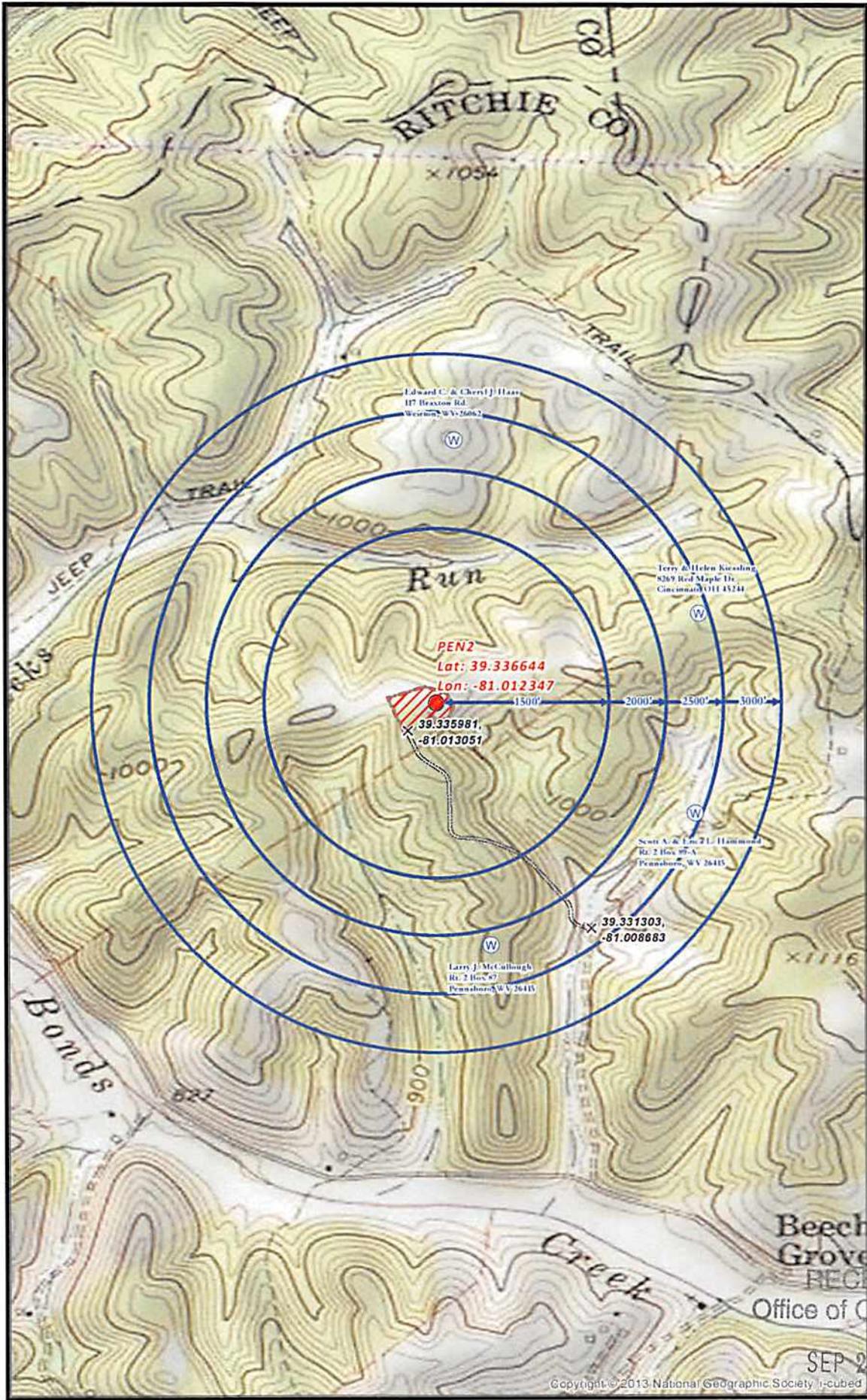
					<b>PENS-2 WELLBORE DIAGRAM</b> Marcellus Shale Horizontal Ritchie County, WV Ground Elevation 1076'					
Ground Elevation		1076'		PENS-2B SHL (Lat/Long)		(308274.09N, 1572131.56E) (NAD27)				
Azm		139.06°		PENS-2B LP (Lat/Long)		(307234.99N, 1571277.33E) (NAD27)				
				PENS-2B BHL (Lat/Long)		(300214.54N, 1577167.73E) (NAD27)				
HOLE	CASING	GEOLOGY	TVD Top	TVD Bottom	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS	
26"	20" 52#				AIR	Grouted to surface	N/A	Ensure the hole is clean at TD.	Stabilize surface fill/soil. Conductor casing = 0.25" wall thickness	
		Conductor		40						
17.5"	13-3/8" 54.5# J-55 BTC				AIR	15.6 ppg Type 1 + 2% CaCl, 0.25# Lost Circ 40% Excess Yield = 1.18 <i>CTS</i>	Bow Spring every 3 joints to surface	Fill with KCl water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Protect freshwater. Surface casing = 0.380" thick. Burst=2730 psi	
		Surface Casing		579						
12.25"	9-5/8" 36# HCK-55 BTC				SOBM 8.0 - 8.5 ppg	50 bbls 10 ppg spacer, 12.0 ppg lead slurry, (800') of 15.6 ppg Class A tail slurry cemented to surface.	Bow Spring centralizers on every joint to KOP, one every third joint from KOP to 100' from surface	Once at TD, circulate at least 2x bottoms up. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement	Casing to be ran below the Alexander. Intermediate casing = 0.352" wall thickness Burst=3520 psi, Collapse 2980 psi	
		Maxton	1929	1973						
		Big Lime	2005	2082						
		Big Injun	2082	2130						
		Weir	2449	2465						
		Fifth	2921	2927						
		Gordon	2950	2952						
		Warren	3532	3566						
		Speechley	3850	4404						
		Riley	4601	4615						
		Benson	4955	4961						
Alexander	5204	5210								
Intermediate Casing		5410								
8.75/8.5"	5-1/2" 20# HCP-110 TXP BTC	Rhinestreet	5740	5908	SOBM 12.5- 13.0 ppg	120 bbls spacer with density and rheology heirarchy, lead slurry to 2000' to recover SOBM, 14.8 ppg Class A tail slurry to inside intermediate casing	Rigid Bow Spring every third joint from KOP to TOC	Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.361" wall thickness Burst=12640 psi Note:Actual centralizer schedules may be changed due to hole conditions	
		Marcellus	6262	6324			Rigid Bow Spring every joint to KOP			
		TD		16145						

8.75/8.5" Hole - Cemented Long String 5-1/2" 20# HCP-110 TXP BTC

*Done 1-21-14*

Plot spotted  
CPC

85  
10088  
8900188



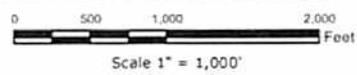
RECEIVED  
Office of Oil and Gas

SEP 28 2013

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**PENS2 SITE SAFETY PLAN**  
- WATER WELLS PROXIMITY -

Water Purveyor Buffer  
 Oil Pad Boundary  
 Proposed Road  
 Road Intersection



Projection: NAD\_83\_12T\_StatePlane\_West\_Virginia\_StatePlane\_12T\_FPS  
Units: Feet US

**noble energy**

Disclaimer: All data is licensed for use by Noble Energy Inc. use only.

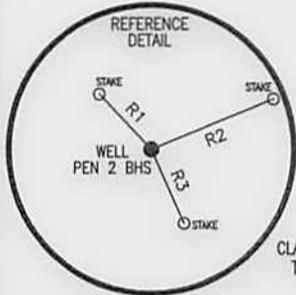
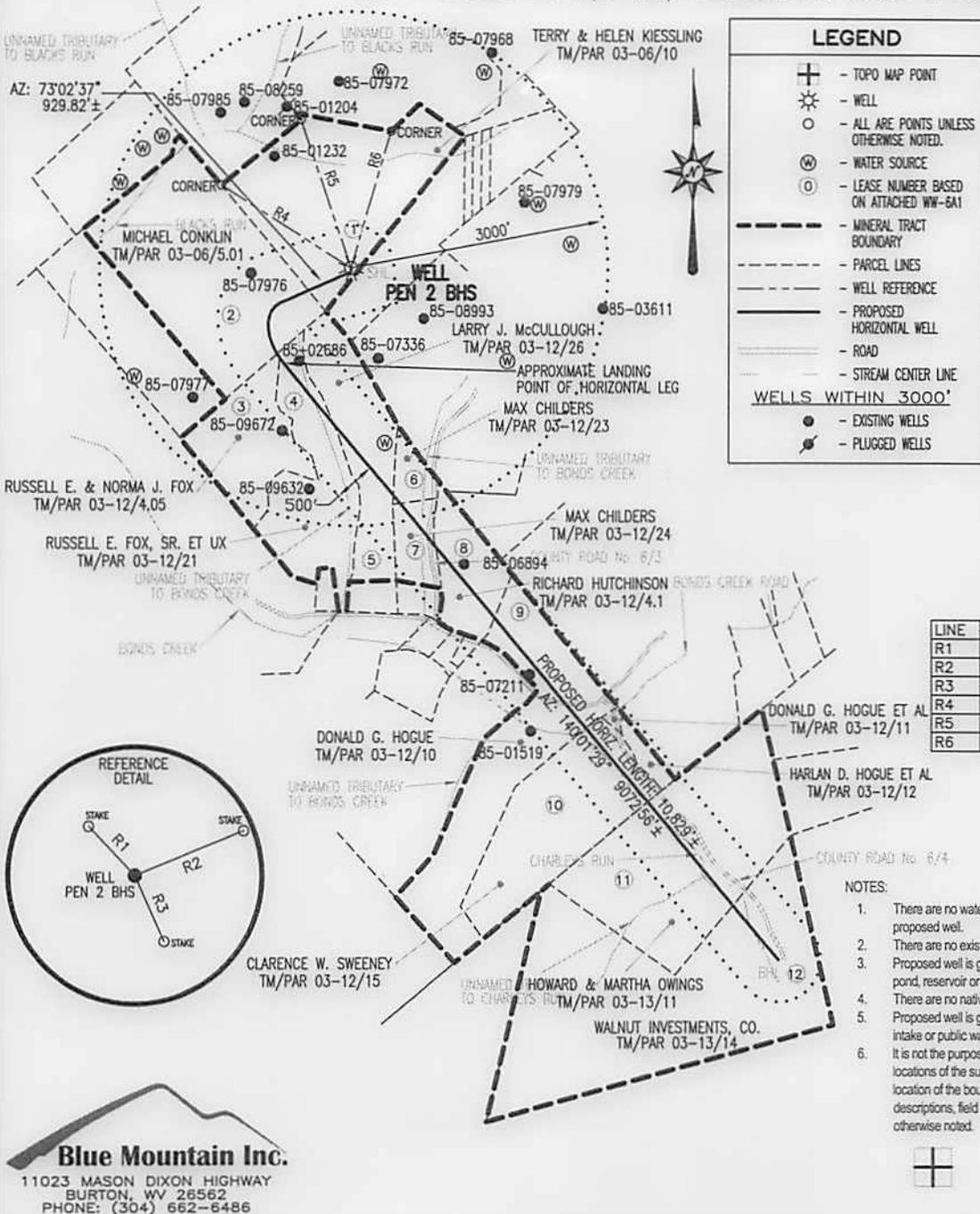
WV Department of Environmental Protection

Doc: 57372514

6/6

Well is located on topo map 13,986' feet south of Latitude: 39° 22' 30"

Well is located on topo map 3,575' feet west of Longitude: 81° 00' 00"

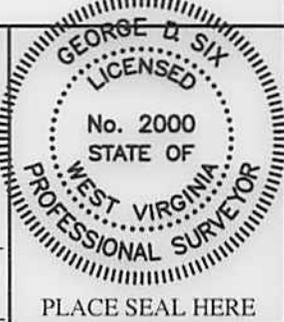


**Blue Mountain Inc.**  
11023 MASON DIXON HIGHWAY  
BURTON, WV 26562  
PHONE: (304) 662-6486

<b>SURFACE HOLE LOCATION (SHL)</b>	
UTM 17-NAD83	N:4354128.62
E:498913.37	NAD27, WV NORTH
N:308274.09	E:1572131.56
LAT/LON DATUM-NAD83	LAT:39.336582
	LOX:-81.012609
<b>APPROX. LANDING POINT</b>	
UTM 17-NAD83	N:4353787.31
E:498677.54	NAD27, WV NORTH
N:307167.02	E:1571338.97
LAT/LON DATUM-NAD83	LAT:39.333506
	LOX:-81.015345
<b>BOTTOM HOLE LOCATION (BHL)</b>	
UTM 17-NAD83	N:4351698.92
E:500488.63	NAD27, WV NORTH
N:300214.54	E:1577167.73
LAT/LON DATUM-NAD83	LAT:39.314689
	LOX:-80.994332

LINE	BEARING	DISTANCE
R1	N 43°41'33" W	157.50'
R2	N 68°09'24" E	277.02'
R3	S 24°10'08" E	167.93'
R4	N 57°51'26" W	1809.46'
R5	N 18°55'40" W	1831.61'
R6	N 16°14'49" E	1665.45'

- NOTES:
1. There are no water wells or developed springs within 250' of proposed well.
  2. There are no existing buildings within 625' of proposed well.
  3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
  4. There are no native trout streams within 300' of proposed well.
  5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
  6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.



FILE #: PEN 2 BHS  
DRAWING #: PEN 2 BHS  
SCALE: 1" = 2000'  
MINIMUM DEGREE OF ACCURACY: 1/2500  
PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: [Signature]  
R.P.E.: \_\_\_\_\_ L.L.S.: P.S. No. 2000

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP  
OFFICE OF OIL & GAS  
601 57TH STREET  
CHARLESTON, WV 25304



DATE: MARCH 25, 2014  
OPERATOR'S WELL #: PEN 2 BHS  
API WELL #: 47 85 10068 146  
STATE COUNTY PERMIT

Well Type:  Oil  Waste Disposal  Production  Deep  
 Gas  Liquid Injection  Storage  Shallow

WATERSHED: NORTH FORK HUGHES RIVER ELEVATION: 1084±  
COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: ELLENBORO, WV 7.5'  
SURFACE OWNER: TERRY & HELEN KIESSLING ACREAGE: 79.242±  
OIL & GAS ROYALTY OWNER: SEE ATTACHED WW-6A1 ACREAGE: 716.083±  
DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE   
PLUG OFF OLD FORMATION  PERFORATE NEW FORMATION  PLUG & ABANDON   
CLEAN OUT & REPLUG  OTHER CHANGE  (SPECIFY): \_\_\_\_\_  
TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,324± TMD: 16,145±  
WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN  
Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590  
City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301